Psychometric Properties of the FACES-IV in a Pediatric Oncology Population

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Objective   The purpose of this study was to examine the psychometric properties of the Family Adaptability and Cohesion Evaluation Scales, version IV (FACES-IV) in families of children with cancer.   **Methods**   As part of a larger program of research, 147 mothers and 40 fathers from 162 families of children with cancer completed the FACES-IV. Parents and one healthy child from each family (77 girls; age $M = 12.8$, $SD = 2.8$) completed additional measures of family functioning and parenting.   **Results**   Internal consistencies above .70 were found for all subscales except one (Enmeshed, $\alpha = .65$). Intercorrelations of the subscales were similar to the validation sample but seemed inconsistent with the Circumplex Model on which the measure is based. Analyses raised questions regarding construct validity for the Enmeshed and Rigid subscales.   **Conclusions**   These preliminary findings suggest that more research is needed prior to widespread use of the FACES-IV in pediatric oncology populations.

Key words   assessment; childhood cancer; FACES-IV; family functioning; psychometrics.

Families are greatly impacted when a child is diagnosed with a chronic health condition. Diagnosis and treatment may be distressing to individuals within the family, family members may have different coping styles influencing how they relate to each other, and new roles and responsibilities may be required to meet the demands of the illness. In addition to the illness affecting the family, the family provides the context in which the child's medical condition is managed. Thus, understanding family reactions when a child is diagnosed with a chronic health condition and reliably and validly assessing their functioning is important. Family measures allow treatment teams and researchers to better understand family responses to stressful circumstances and their strengths and weaknesses for managing the child's medical condition.

The Circumplex Model of Marital and Family Systems (Olson, 2000; Olson & Gorall, 2003; Olson, Russel & Sprenkle, 1983) has been of interest to researchers and clinicians in pediatric psychology for over 20 years (e.g., Hanson et al., 1989; Magill & Hurlbut, 1986). This model characterizes families on two orthogonal dimensions: cohesion and flexibility. *Cohesion* refers to the emotional bonds between family members and *Flexibility* refers to the quality and expression of the family's leadership, organization, roles, and relationship rules. Well-functioning families are considered *balanced*, falling mid-range on each dimension. Poorly functioning families are considered *unbalanced* on these dimensions, falling either low (e.g., disengaged, rigid) or high (enmeshed, chaotic) on these characteristics. Across the family life cycle and in response to stress, families are expected to shift along these dimensions in predictable ways. For example, when confronted with the diagnosis of illness in a family member, families are predicted to become more chaotic and enmeshed during the crisis of diagnosis, then become more rigid as a treatment regimen is put in place and adopted.

Eventually, these families are postulated to move back toward the balanced ranges again.

Like other health threats, a diagnosis of childhood cancer challenges the family and the Circumplex Model has been used specifically to conceptualize family functioning when a child is diagnosed with cancer (Alderfer & Kazak, 2006). Shortly after diagnosis and throughout cancer treatment, many parents and siblings report high levels of distress (Houtzager, Grootenhuis, Hoekstra-Weebers, Caron & Last, 2003; Kazak, Boeving, Alderfer, Whang & Reilly, 2005; Patino-Fernandez et al., 2008). Parenting stress is high and parental consistency is variable shortly after diagnosis (Steele, Long, Reddy, Luhr, & Phipps, 2003), and extreme changes occur in family roles and responsibilities to accommodate treatment (McCubbin, Balling, Possin, Friedrich, & Bryne, 2002). Interestingly, most patients themselves experience heightened distress shortly after diagnosis then return to normative or better than average levels of functioning (Vannatta, Salley & Gerhardt, 2009) perhaps because of the special place they assume within the family (Kazak, Rourke & Navsaria, 2009). Some reports also indicate that families become closer and more cohesive after diagnosis (e.g., Varni, Katz, Colegrove & Dolgin, 1996) and that families of children with cancer are more likely to be chaotic and rigid when compared to community controls (Horwitz & Kazak, 1990; Madan-Swain et al., 1994).

A series of assessment tools have been developed to capture the constructs of the Circumplex model. The Family Adaptability and Cohesion Evaluation Scale, Version IV (FACES-IV) is the current self-report questionnaire used to assess the primary dimensions of the Circumplex model (Olson & Gorall, 2003). This latest revision was deemed necessary because previous versions of the instrument have produced scores that are often linearly related to adjustment and outcomes. For example, within families of children with cancer, greater levels of cohesion have been linked to less distress and loneliness and more positive feelings for mothers (Maurice-Stam, Oort, Last, & Grootenhuis, 2008) and less malaise for mothers and fathers (Sloper, 2000). Furthermore, higher levels of cohesion and adaptability have been associated with better functioning for adolescent survivors of childhood cancer (Rait et al., 1992); however, such relationships are inconsistent in the literature (Kazak et al., 1997). A linear relationship between cohesion and adaptability and positive outcomes is inconsistent with the Circumplex model because families extremely low and extremely high on each of these dimensions are postulated to be poorly functioning. The authors of the FACES

have concluded that previous versions of this measure do not adequately assess the extremes of each dimension.

To create the FACES-IV, 60 items from earlier versions of the measure were combined with 24 new items designed to assess the extremes of cohesion and flexibility. The resulting measure was administered to 124 college students who recruited additional participants for class credit, producing usable data from 469 participants, 71% of whom were female with an average age of 28 years (median = 22); 64% were single (Gorall, Tiesel & Olson, 2006). Factor analyses were conducted on these data and after elimination of cross- and low-loading items, 42 items remained loading on two ''balanced'' scales, Balanced Cohesion (e.g., ''Family members are supporting of each other during difficult times'') and Balanced Flexibility (e.g., ''My family is able to adjust to change when necessary'') and four ''unbalanced'' scales including Disengaged (e.g., ''Family members seem to avoid contact with each other when at home''), Enmeshed (e.g., ''We spend too much time together''), Rigid (e.g., ''There are strict consequences for breaking rules in our family'') and Chaotic (e.g., ''Our family feels hectic and disorganized'').

These six 7-item scales had adequate internal consistencies (αs: Disengaged, .87; Enmeshed, .77; Rigid, .83; Chaotic, .85; Balanced Cohesion, .89; Balanced Flexibility, .80; Gorall et al., 2006). The balanced scales were positively, significantly and strongly correlated at .60. Balanced Cohesion and its low extreme (Disengaged) were highly negatively correlated ($r = -.80$); a small negative correlation was found between Balanced Cohesion and its high extreme (Enmeshed, $r = -.14$). Balanced Flexibility produced a negative, medium sized correlation with its low extreme (Chaotic, $r = -.30$) and a small correlation with its high extreme (Rigid, $r = -.16$). The unbalanced flexibility scales, Chaotic and Rigid ($r = .19$) and the unbalanced cohesion scales, Disengaged and Enmeshed were modestly and positively correlated ($r = .26$). Across dimensions the unbalanced scales were positively correlated: Disengaged and Chaotic were highly correlated at .59; Enmeshed was moderately correlated with both Rigid ($r = .38$) and Chaotic ($r = .36$); Disengaged and Rigid were modestly correlated at .28 (Gorall et al., 2006).

These new subscale scores are designed to be linearly related to adjustment, positively for the balanced scales and negatively for the unbalanced scales. Validity analyses correlating the FACES-IV subscales with the General Functioning subscale of the Family Assessment Device (scored such that higher scores indicate better functioning) revealed strong positive correlations with Balanced Cohesion ($r = .85$) and Balanced Flexibility ($r = .63$); strong negative correlations with Disengaged ($r = -.82$)

and Chaotic ($r = -.63$); and small but significant negative correlations with Enmeshed ($r = -.27$) and Rigid ($r = -.20$) scores (Gorall et al., 2006).

To date, publications reporting data from the FACES-IV have investigated college students and their families (Craddock, 2001) and healthy adolescent females (Franklin, Streeter, & Springer, 2001). These two published empirical reports provide some psychometric information for the FACES-IV and it has been deemed a "promising" measure of family functioning (Alderfer et al., 2008). However, this measure has not yet been used or examined in families after the diagnosis of a chronic medical condition. Given the possible value and interest in a self-report instrument that could reliably and validly tap the constructs of the Circumplex model among families of children with chronic illness, we examined the psychometric properties of the FACES-IV in a sample of families of pediatric oncology patients. Parents completed the FACES-IV and they and one healthy child within the family completed additional measures of family functioning and parenting behaviors. Data from a healthy sibling of the child with cancer was thought to add an important perspective regarding the functioning of the family.

To examine reliability of the FACES-IV, internal consistency of the subscales and consistency of ratings across parents within the same family were examined. To assess the validity of measure, intercorrelations of the subscales were calculated and compared to those reported for the original validation sample to determine if the measure was behaving similarly across samples and conforming to the Circumplex Model. Additionally, FACES-IV subscale scores were correlated with other measures of family functioning and acceptance, firm control, and psychological control within parent–child relationships. General measures of family functioning were chosen to validate the FACES-IV as higher scores on Balanced Cohesion and Balanced Flexibility and lower scores on the Disengaged, Enmeshed, Chaotic and Rigid subscales are postulated to be indicative of better family functioning. These are the relationships we hypothesized. Measures of psychological and firm control were chosen to further explore the validity of the Enmeshed and Rigid subscales; these scales were not highly associated with general family functioning in the validation sample (Gorall et al., 2006). It was expected that psychological control would be positively related to the Enmeshed subscale and that firm control would be positively related to the Rigid subscale.

Methods
Participants

As part of a program of research regarding siblings of children with cancer, 147 mothers, 40 fathers, and 162 siblings of children diagnosed with cancer provided data. A total of 162 families (78% of those approached) participated: 147 families provided data from mothers and children; 40 families provided data from fathers and children; 25 provided data from both parents (only 35 two-parent families were asked to provide data from both parents).

Nearly all participating families included two caregivers in the home ($n = 149$; 92%) with most indicating they were currently married ($n = 139$; 86%); 30 families (19%) were blended. The number of family members living in the household ranged from 3 to 13 with a modal number of four members (2% had three; 39% had four; 32% had five; 17% had six members, and 10% had more than six members). The majority of the participants identified themselves as Caucasian/not Hispanic (86%) with 9% identifying as Black or African American/not Hispanic and 4% indicating they were Hispanic. Annual household income ranged from <\$50,000 (22%) to >\$100,000 (41%), with the remainder of families (37%) reporting incomes between \$50,000 and \$100,000. Participating parents were in their early to mid-forties (mothers: $M = 41.3$, $SD = 5.8$; fathers: $M = 44.2$, $SD = 5.7$). Within families, all healthy children between the ages of 8 and 18 were permitted to participate, but one child's data was randomly selected from each family to be included in the analyses. The average age of the children selected for this report was 12.8 years ($SD = 2.8$; range 8–18) and roughly half of the sample was female ($n = 77$; 48%). The children with cancer were 3.7–38.0 months ($M = 16.7$ months; $SD = 6.9$) post-diagnosis. Cancer diagnoses included hematological malignancies (34% leukemias; 15% lymphomas); solid tumors (36%); brain tumors (13%) and other (2%).

Procedure

To identify potential participants, researchers reviewed the tumor registry of a division of oncology in a large eastern children's hospital. Eligible families included: (a) a child diagnosed with cancer or a brain tumor, still receiving cancer treatment or, if off treatment, within 2 years of receiving the diagnosis; and (b) at least one healthy child between the ages of 8 and 18 years. Families believed to meet eligibility criteria were sent letters of invitation and then contacted by phone to confirm eligibility, answer

questions, and ascertain interest in participation in the study. Home visits were scheduled with those interested in participating to obtain parental informed consent and child assent, and collect data. Parents and children (siblings of the child with cancer) completed packets of questionnaires including measures of family functioning and parenting behavior. Parents completed the FACES-IV and the Perceived Parental Self-Efficacy Scale (PPSES), and both parents and children completed the Family Assessment Device (FAD), the Perceived Collective Family Efficacy Scale (PCFES), and the Child Report of Parental Behavior Inventory (CRPBI; child and parent versions) Families received $50 to thank them for their participation. These procedures were approved by the hospital's institutional review board.

Measures

FACES-IV

The FACES-IV (Olson, Gorall & Tiesel, 2006) was completed by parents participating in this study. As explained in the Introduction, this measure is designed to assess family cohesion and flexibility as suggested by the Circumplex Model of Marital and Family Systems. The FACES-IV includes 42 items loading on six subscales: Balanced Cohesion, Balanced Flexibility, Disengaged, Enmeshed, Rigid, and Chaotic.

McMaster Family Assessment Device (FAD)

The FAD (Epstein, Baldwin, & Bishop, 1983) was completed by both parents and children in this study. It is considered a "well-established" self-report family functioning instrument (Alderfer et al., 2008) and has been used in many chronic illness populations, including families of children with cancer (e.g., Kabacoff, Miller, Bishop, Epstein, & Keitner, 1990). The FAD is a 60-item measure with a four-point Likert scale response format ($1 =$ strongly agree to $4 =$ strongly disagree), yielding seven subscales. The 12-item General Functioning subscale was used in the current study (e.g., "In times of crisis we can turn to each other for support.") Higher scores typically indicate poorer family functioning, but were reversed in this study to ease interpretation. Internal consistency for the General Functioning subscale has ranged from .85–.90 in past research (Alderfer et al., 2008) and was .83 for mother report, .88 for father report, and .83 for child report in this study. Scores between mothers and fathers from the same family in our sample were moderately correlated ($r = .41$, $p = .05$), scores between mothers and children were modestly correlated ($r = .34$, $p < .001$) and scores

between fathers and children showed no significant relationship ($r = .12$, $p = .48$).

Perceived Collective Family Efficacy Scale (PCFES)

The PCFES (Caprara et al., 2004) assesses family members' beliefs about the family's capability to accomplish tasks necessary for family functioning (e.g., "How well, working together as a whole, can your family: support each other in times of stress?"; "celebrate family traditions even in difficult times?"). It was completed by both parents and children in this study. The 20-item scale is rated on seven-point Likert scales ($1 =$ "Not well at all" to $7 =$ "Very well"). Higher scores indicated better family functioning efficacy. Previous research revealed internal consistencies ranging from .96 to .97 (Caprara et al., 2004). Internal consistency in the current study was .94 for mother report and .93 for father and child report. For family members from the same family, mother and father reports on the PCFES were moderately correlated ($r = .44$, $p = .03$); mother and child report were modestly but significantly correlated ($r = .23$, $p < .01$); child and father report were not significantly correlated ($r = .13$, $p = .43$).

Perceived Parental Self-efficacy Scale (PPSES)

The PPSES (Caprara et al., 2004) is a measure completed by parents to assess their beliefs about their ability to communicate with and support their children and to deal with challenges and maintain rules as their children begin to individuate from the family (e.g., "How well can you attend to your son/daughter when you are worried about personal, family, or work matters"; "How well can you get your son/daughter to confide in you about his/her worries"). The scale contains twelve items, which parents rate on a seven-point Likert Scale ($1 =$ "Not well at all" to $7 =$ "Very well"). Higher scores indicate more parental efficacy. Previous estimates of internal consistency for the measure were high across mothers and fathers, $\alpha = .92–.94$. In our sample, coefficient alpha was slightly lower, but acceptable: mother report, .86; father report, .83.

The Revised Children's Report of Parental Behavior Inventory (CRPBI-30)

The CRPBI-30 (Schuldermann & Schuldermann, 1988) was designed to measure children's perspectives of parenting behaviors; a parent self-report version is also available. Both versions were used in this study. Children complete the scale separately for each of their parents. The CRPBI-30 contains 30 items, each rated on three-point Likert scales ($1 =$ "Not like my parent" to $3 =$ "A lot like my parent"). The instrument consists of three subscales: Acceptance

(e.g., ''My mother/father is a person who: makes me feel better after talking over my worries with her/her''), Psychological Control (e.g., ''says if I really cared for her/him, I would not do things that cause her/him to worry''), and Firm Control (e.g., ''is very strict with me''). Higher scores indicate more of the specified construct. Findings in the current study resulted in acceptable internal consistencies for child report (Acceptance α = .89; Psychological Control α = .82; Firm Control α = .69), though they were somewhat lower for parent reports (Mother: Acceptance α = .78; Psychological Control α = .70; Firm Control α = .60; Father: Acceptance α = .76; Psychological Control α = .25; Firm Control α = .71). Because of the poor internal consistency for father reports of psychological control, these data were not used. Correlations between parent self ratings and the ratings of their children were as follows: Acceptance, mothers and children, $r = .34$, $p < .001$ and fathers and children, $r = .24$, $p = .14$; Psychological Control, mothers and children, $r = .19$, $p = .02$; Firm Control, mothers and children, $r = .31$, $p < .001$ and fathers and children, $r = .27$, $p = .10$.

Statistical Approach

Data from mothers and fathers were analyzed separately, except when compared within families. Because the Circumplex Model suggest changes in cohesion and adaptability as a family adjusts to illness, preliminary analyses were conducted to determine if our sample could be analyzed as a whole despite heterogeneity in time since diagnosis. Families within the first year post-diagnosis did not differ from those within the second year post-diagnosis on FACES-IV scores (t's < 1.6; $ps > .11$; those greater than 2 years post-diagnosis were not included in this preliminary analysis as those participants were required to be on treatment for participation; see eligibility criteria above). Two methods were used to assess reliability of the FACES-IV. First, internal consistency of the FACES-IV subscales was calculated with Cronbach's coefficient α and descriptive statistics (i.e., mean, standard deviation, range, skew) were used to summarize and characterize the distributions of the scores. Second, paired sample t-tests were used to compare mother's and father's reports within families. Given our sample size for families with data from both parents ($n = 25$) we had a power of .67 to find significant at alpha = .05, a moderately sized difference (.5 SD) between mothers and fathers. Because of our limited power, we also examined effect sizes (Cohen's d; Kotrlik & Williams, 2003) to help interpret these data. Two analyses were used to assess the validity of the measure. First, intercorrelations of the subscales were calculated and compared to past findings to see if the measure

behaved similarly across our sample and Olson's validation sample and if the pattern of scores supported the Circumplex Model. Second, FACES-IV subscale scores were correlated with scores on other measures of family functioning and parenting. To account for the number of analyses, p-values $< .01$ were considered statistically significant; however, because of our limited statistical power in some subsets of the data, we also discuss correlations achieving medium (.30–.49) and large ($\geq .50$) effect sizes (Cohen, 1988).

Results

Internal Consistency and Descriptive Statistics of FACES-IV Subscales

Internal consistency, means, SDs, range and skew for the FACES-IV subscales are presented in Table I. Overall, internal consistencies for the subscales were lower than in the validation sample, with most falling in the .70–.78 range across reporters. These values are considered acceptable for research purposes (Nunnally, 1978). The Enmeshed subscale had the lowest and only unacceptable internal consistency value, .65 across both mothers and fathers. This subscale also had the lowest internal consistency in Olson's validation sample (α = .77; Gorall et al., 2006). Mothers' scores on many of the subscales were significantly skewed (Skew/SE of Skew > 3.0; Tabachnick & Fidell, 1989) including Balanced Cohesion (negatively), Disengaged, Enmeshed, and Chaotic (positively). Fathers' scores on the Disengaged scale were also significantly positively skewed. Efforts to apply consistent transformations (square root or reflect and square root) to the subscale scores to correct skew did not adequately improve the distribution of the data across all subscales. Thus, the data were not transformed for the remainder of the analyses.

Table I. Internal Consistency (Alphas), Means, SDs, Skew, and Range for FACES IV Subscales for Mothers ($N = 147$) and Fathers ($N = 40$)

Subscales	α	M	SD	Skew/SE	Min/Max
Balanced Cohesion: Mothers	.78	29.1	4.31	−.98/.20	11/35
Fathers	.76	29.1	3.86	−.88/.38	20/35
Balanced Flexibility: Mothers	.74	20.9	4.83	−.09/.20	9/34
Fathers	.73	20.8	4.28	.36/.38	14/30
Disengaged: Mothers	.74	10.1	3.84	2.09/.20	7/29
Fathers	.83	10.1	3.70	1.51/.38	7/21
Enmeshed: Mothers	.65	10.9	3.88	.95/.20	7/23
Fathers	.65	10.9	3.48	.77/.38	7/21
Rigid: Mothers	.70	16.5	4.50	.26/.20	7/31
Fathers	.77	16.8	4.90	.80/.38	10/29
Chaotic: Mothers	.72	12.2	4.24	.82/.20	7/26
Fathers	.81	12.5	4.26	.65/.38	7/21

Comparisons and Correlations of Mother and Father FACES-IV Ratings Within Families

A series of paired sample t-tests were used to compare mothers' and fathers' ratings on the subscales within families. None of these tests revealed significant differences, t's $(23) < 1.6$; $ps > .12$, and effects sizes were small (Cohen's d's $< .33$) suggesting that mothers and fathers rated their families similarly. Correlations between mothers' and fathers' scores within families revealed low to moderate, non-significant or marginally significant correlations for both the balanced (Balanced Cohesion: $r = .38$, $p = .07$; Balanced Flexibility: $r = .43$, $p = .04$) and unbalanced subscales (Disengaged: $r = .26$, $p = .22$; Enmeshed: $r = .12$, $p = .57$; Rigid: $r = .46$, $p = .02$; Chaotic: $r = .31$, $p = .14$).

Intercorrelations of the FACES-IV Subscales

The intercorrelations of the FACES-IV subscales for mothers and fathers are presented in Table II. Mothers' data is reported below the diagonal and fathers' data is reported above. For the most part, our pattern of correlations is consistent with the correlations derived from the validation sample as summarized earlier (Gorall et al., 2006); however most of our correlations were smaller in magnitude. Balanced Cohesion and Balanced Flexibility were moderately and positively correlated (r's $= .49$ and $.38$, mothers and fathers, respectively). Balanced Cohesion was negatively and moderately to highly correlated with Disengaged scores (r's $= -.41$ and $-.68$); the correlation between Balanced Cohesion and Enmeshed was negligible. Examination of associations between the scales assessing the flexibility dimension revealed small or negligible correlations (r's $< .23$). Unlike the validation sample which produced modest correlations, Disengaged and Enmeshed, the extremes of cohesion, were moderately correlated in our sample across mothers and fathers (r's $= .41$ and $.48$). Among the unbalanced scales representing different dimensions, our findings were primarily consistent with those reported in the validation

sample with one nuance: across the validation sample Enmeshed was moderately related to both Rigid and Chaotic, but in our sample only mothers produced a similar correlation between Enmeshed and Rigid ($r = .45$) and only fathers produced a similar correlation between Enmeshed and Chaotic ($r = .50$).

Construct Validity Analyses—Mother-report FACES-IV

Table III provides correlations among the mother-reported FACES-IV subscales and the other family functioning and parenting measures. In general, significant correlations were found in expected directions with the balanced scales producing positive and significant correlations with mother's reports of better family functioning on the FAD, PCFES, and PPSES and more parental acceptance on the CRPBI. Correlations between mother's scores on the balanced subscales and father reports of family functioning and children's reports of family functioning and maternal parenting were less consistent and when significant correlations were present, they tended to be modest (r's $< .30$).

Mothers' scores on the Disengaged and Chaotic subscales were negatively and significantly associated with mothers' reports of better family functioning on the FAD, PCFES, and PPSES. They were also negatively correlated with mothers' reports of greater parental acceptance and positively associated with mothers' reports of use of psychological control on the CRPBI. Correlations between mothers' scores on these two unbalanced subscales and father's and children's reports were less consistent. The only cross-reporter correlations that fell into the moderate range (albeit non-significant, given our sample size) were with fathers reports on the FAD (r's in the $-.45$ to $-.43$ range).

Mothers' scores on the Enmeshed and Rigid subscales were not significantly associated with measures of family functioning, however they were positively and significantly associated with mothers' reports of psychological control on the CRPBI. Mothers' scores on the Rigid subscale were

Table II. Intercorrelations of Mothers and Fathers FACES IV Subscales

	Balanced Cohesion	Balanced Flexibility	Disengaged	Enmeshed	Rigid	Chaotic
Balanced Cohesion		.38	−.68**	−.31	−.17	−.55**
Balanced Flexibility	.49**		−.05	−.11	−.22	−.06
Disengaged	−.41**	−.07		.48*	.15	.68**
Enmeshed	−.05	.09	.41**		.17	.50*
Rigid	.20	.20	.25*	.45**		−.11
Chaotic	−.37**	−.12	.55**	.27*	.05	

Note. Correlations below the diagonal are the intercorrelations of mothers' scores, those above the diagonal report father data.
*$p < .01$, **$p < .001$.

Table III. Correlations Between Mother–Report FACES IV Subscales and Family Measures

	Balanced Cohesion	Balanced Flexibility	Disengaged	Enmeshed	Rigid	Chaotic
FAD (reverse scored)						
Mother ($n = 147$)	.59**	.26*	−.47**	−.09	−.06	−.54**
Father ($n = 24$)	.27	.18	−.45	−.21	−.07	−.43
Child ($n = 147$)	.26*	.13	−.28*	−.18	−.13	−.19
PCFES						
Mother	.60**	.41**	−.38**	−.01	.09	−.48**
Father	.30	.17	−.25	−.10	.03	−.17
Child	.25*	.05	−.24*	−.13	−.12	−.25*
PPSES						
Mother	.48**	.34**	−.36**	−.11	−.01	−.40**
Father	.14	−.20	−.23	.08	−.10	.08
CRPBI: acceptance						
Mother	.43**	.24*	−.31**	−.04	−.03	−.27*
Child	.22*	−.04	−.26*	−.18	−.10	−.25*
CRPBI: psych control						
Mother	−.04	−.03	.35**	.47**	.30**	.28**
Child	−.20	−.04	.09	.07	.09	−.02
CRPBI: firm control						
Mother	.19	.07	−.08	.13	.51**	−.22*
Child	.04	−.02	−.04	−.01	.18	−.16

Note. FAD: Family Assessment Device; PCFES: Perceived Collective Filial Efficacy Scale; PPSES: Parental Perceived Self Efficacy Scale; CRPBI: Child Report of Parental Behavior Inventory.
*$p < .01$, **$p < .001$.

positively and moderately associated with their, but not their child's, report of firm control on the CRPBI.

Construct Validity Analyses—Father-report FACES-IV

Table IV provides correlations among the father-reported FACES-IV subscales and the other family functioning and parenting measures. In general, significant or non-significant yet moderately sized correlations were found in expected directions mirroring those findings for mother's FACES subscale. That is, higher Balanced Cohesion scores and lower Disengaged and Chaotic scores were associated with father's reports of greater family functioning on the FAD, PCFES, PPSES, and more parental acceptance on the CRPBI. Similar cross-informant correlations were found with mothers' reports on the FAD and PCFES. Also father's Rigid scores were significantly related to his but not his child's reports of Firm Control on the CRPBI. One notable difference from the pattern for Mother-report FACES-IV was that no significant relationships were found between father's Balanced Flexibility scores and the other measures; only the correlation between Balanced Flexibility and PCFES fell in the moderate range.

Discussion

The current study examined the psychometric properties of the FACES-IV when used with families of children with cancer. Overall, the internal consistencies of the FACES-IV subscales are adequate and many of the subscales demonstrated predicted associations with other measures of family functioning and parenting providing evidence of construct validity. However, our pattern of results raises some questions regarding the utility of some of the new subscales and the ability of this measure to adequately capture important aspects of the Circumplex Model. Overall, we recommend that more research be conducted on this measure prior to widespread use with families of children with cancer and other chronic illnesses.

Our findings suggested that the Enmeshed and Rigid subscales of the FACES-IV may need further development. On a positive note, the Rigid subscale was related to mothers' and fathers' reports of using firm control within their family and mother-reported enmeshment was significantly related to her report of using forms of psychological control in her parenting. However, the Enmeshed scale had an internal consistency below .70 for both mothers and fathers in our sample and these ''unbalanced'' scales were not associated with measures of family functioning. The Circumplex Model predicts that families may move

Table IV. Correlations Between Father–Report FACES IV Subscales and Family Measures

	Balanced Cohesion	Balanced Flexibility	Disengaged	Enmeshed	Rigid	Chaotic
FAD (reverse scored)						
Mother (n = 24)	.54*	.20	−.44	.02	−.42	−.32
Father (n = 39)	.59*	.27	−.57**	−.24	−.09	−.72**
Child (n = 39)	.39	.03	−.24	−.12	.15	−.26
PCFES						
Mother	.46	.03	−.39	−.20	−.24	−.40
Father	.75**	.37	−.57**	−.32	.03	−.66**
Child	.12	−.01	−.08	.02	.12	−.02
PPSES						
Mother	.29	.05	−.16	−.10	.10	−.14
Father	.58**	−.02	−.39	−.22	.10	−.53**
CRPBI: acceptance						
Father	.60**	.10	−.45*	−.26	−.02	−.35
Child	.26	.27	−.04	−.17	−.06	−.09
CRPBI: psych control						
Child	−.31	−.14	.07	.04	−.08	.17
CRPBI: firm control						
Father	.10	−.08	−.31	−.19	.47*	−.31
Child	−.08	−.19	−.05	.16	.25	−.10

Note. FAD: Family Assessment Device; PCFES: Perceived Collective Filial Efficacy Scale; PPSES: Parental Perceived Self Efficacy Scale; CRPBI: Child Report of Parental Behavior Inventory.

*$p < .01$, **$p < .001$.

toward Enmeshment after a diagnosis of a chronic illness in the family and may become more Rigid when adopting a complicated treatment regimen. The families in our sample were dealing with a child on cancer treatment or within 2 years of diagnosis and that may have influenced their scores on these subscales. We did not have a comparison group of families with only healthy children, so we cannot be sure if our sample scored more highly on these scales than families in the general population, but the range of scores on these two subscales seemed similar to the ranges found for the other two unbalanced scales, so it is unlikely that a restricted range led to this pattern.

Alternatively, the problems that arose with these scales in our population may be due to differences in the ages of our sample and the original validation sample. The Circumplex model proposes that families move in predictable ways across the dimensions of cohesion and flexibility as a function of the developmental stage of the children within the family (Olson & Gorall, 2003). Families with older children are postulated to be less rigid and enmeshed compared to families with younger children. Our families had children between the ages of 8 and 18 years while the validation sample included families of college students. This second possibility raises specific concerns about the original validation sample, the resulting measure, and its utility in families with children under the age of 18 years.

Unfortunately, descriptions of the validation sample in the instrument's manual (Gorall et al., 2006) do not provide detail regarding the family structure, number and ages of children within these families, ages of the parents, or other important family demographics, so it is difficult to assert that differences in developmental stage are indeed leading to our different pattern of results. Further development of the instrument should be conducted with families with children representing a broad range of ages so that differences between various family types can be reflected in terms of degree or amount of cohesion and flexibility.

On a more positive note, consistent with previous findings that cohesion and adaptability scores are linearly related to adjustment (e.g., Franko et al., 2008; Gorbett & Kruczek, 2008; Steinhausen, Haslimeier & Metzke, 2007; Uruk, Sayger & Coqdal, 2007), current results indicate that higher scores on the balanced subscales (cohesion, flexibility) were related to better family functioning for mothers. Father's reports of Balanced Cohesion showed a similar pattern, but father-reported Balanced Flexibility did not. Current results are also similar to findings reported by Craddock (2001) and Franklin and colleagues (2001) which illustrated a linear relationship between the unbalanced scales and maladjustment (e.g., family functioning, parenting style). We found this pattern for the Disengaged and Chaotic subscales. It should be noted however, that

when we found significant correlations in the predicted directions, they rarely generalized across reporters, clustering instead within scores from a single reporter. Therefore, method variance may have contributed to our findings.

Inspection of the intercorrelations of the subscales raised some concerns as to the ability of this new measure to adequately capture the Circumplex model. First, Balanced Cohesion and Balanced Flexibility, hypothesized to be orthogonal dimensions, were moderately and positively correlated. Of course, this pattern was also found in the validation sample. In our sample, Disengaged and Enmeshed scores were positively and moderately correlated, even though they are postulated to be opposite extremes of a single cohesion dimension. Lastly, the two Unbalanced scales that had the greatest evidence of construct validity (Disengaged and Chaotic) tended to be moderately negatively correlated with their Balanced scale counterparts. This led us to wonder if the shared variance among these scales may have led to the pattern of results that seems to provide evidence of construct validity for these unbalanced scales.

Limitations

While the findings from the current study begin to increase our understanding of the utility of the FACES-IV in families of children with cancer, there are several limitations. First, the sample was fairly homogeneous in ethnicity and socio-economic status. More specifically, the majority of families consisted of two-parent households, self-identified as Caucasian, and were middle to upper-class (based on income), thus limiting the generalizability of the findings. Additionally, the sample of fathers ($N = 40$) and the sub-sample of families with two parents completing the FACES-IV were small ($n = 25$) limiting our statistical power. Furthermore, the children with cancer did not provide data. We feel that assessing the perspective of healthy children within these families provided us with a unique and often ignored perspective of the functioning of these families, but do note that these child and parent reports tended to be unrelated and cross-informant patterns did not readily emerge. It would have been valuable to collect the perspectives of all of the family members.

Future Directions

Our findings suggest that additional research is needed in order to better understand the psychometric properties of the FACES-IV in chronic illness populations. First, future research focused upon validating the measure in families of healthy children of a broad age range is needed along with additional work in families of children with chronic illness. Specific attention should be paid to further development of

the Enmeshed and Rigid scales. Test-retest reliability of the FACES-IV, as well as information on the psychometric properties of this measure when completed by children and adolescents would be valuable. Further analysis of inter-rater reliability across family members is needed. Tests of construct validity comparing the self-report FACES-IV to observed and coded family behaviors would provide a better test of its construct validity. Additionally, examination of the structure of the measure in additional samples would be useful. Longitudinal studies with the FACES-IV would show whether the measure can capture changes in families over time as children age and families navigate stressful experiences, such as medical diagnoses and treatment processes. Furthermore, future research should examine the predictive validity of the FACES-IV to determine its utility in clinical and research settings.

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